Amendments to the Claims:

The following listing of claims will replace all prior versions, and listings, of claims in the application:

Please delete claim 3 without prejudice to or disclaimer of the subject matter contained therein.

1. (Currently Amended) A silica glass member, which is a silica glass member for use with a light having a specific wavelength of 250 nm or shorter,

in which the difference in the maximum and the minimum values of hydroxyl group concentration as measured in a plurality of points within a plane vertical to an optical axis whose center is the crossing point of its optical axis with the optical axis of the silica glass member is 50 ppm or lower;

in which the plurality of signed birefringence values obtained based on the birefringence values measured on several points within a plane vertical to an optical axis whose center is the crossing point of its optical axis with the optical axis of the silica glass member and the direction of the fast axis fall within a range of from -2.0 to +2.0 nm/cm,

wherein said plurality of signed birefringence values of said silica glass member are expressed based on the formulae as follows:

$$-2.0 \le B_{ij} \le 2.0 \text{ nm/cm} \tag{1}$$

$$B_{ij} = \frac{\sum_{k=1}^{h} A_{ijk}}{h} \tag{2}$$

where, in formula (1) and (2) above,

i represents the number of said silica glass members L (i = 1, 2, ... m; 2 ≤ m),

j represents the number of concentrical virtual circles C present on an effective cross section vertical to the optical axis of said silica glass member L, each having a center on

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said optical axis and different from each other in radius from said optical axis ($j = 1, 2, \ldots n$; $1 \leq n$),

        k represents the number of measuring points located on the circumference of said concentrical circles C ($k = 1, 2, \ldots h$; $1 \leq h$),

        A_{ijk} represents the signed birefringence value at the kth measuring point P_{ijk} located on the circumference of a concentrical circle C_{ij} of a silica glass member Li, and B_{ij} represents the mean signed birefringence value corresponding to the arithmetic mean of the signed birefringence values of the measuring points located on the circumference of a concentrical circle C_{ij} of a silica glass member Li.

2.   (Original) A silica glass member as claimed in Claim 1, wherein the silica glass member is used with a light having a specific wavelength of 180 nm or shorter, and

        wherein the maximum value of the hydroxyl group concentration as measured in a plurality of points within a plane vertical to an optical axis whose center is the crossing point of its optical axis with the optical axis of the silica glass member is 50 ppm or lower.

3.   (Canceled).

4.   (Original) A method for producing a silica glass member, comprising:

        a synthetic step of silica glass bulk comprising, in a synthetic furnace equipped with a burner having a plurality of tubes, ejecting a raw material and a combustion gas from the plurality of tubes of said burner to hydrolyze said raw material in an oxyhydrogen flame, and thereby synthesizing a silica glass bulk having a difference in the maximum and the minimum values of hydroxyl group concentration as measured in a plurality of points within a predetermined internal plane of the bulk of 50 ppm or lower;

        a step of cooling silica glass bulk, comprising cooling said silica glass bulk under a pressure range of from 0.01 to 0.15 MPa (abs) while controlling the cooling rate in the temperature region of from 1500 to 1800 °C to a range of from 5 to 10 °C/min;

a step of cutting silica glass bulk, comprising cutting out said silica glass bulk to obtain a silica glass member having the desired shape and size; and

a step of heat treating silica glass member, comprising applying a heat treatment to said silica glass member to obtain a silica glass member in which a difference in the maximum and the minimum values of hydroxyl group concentration as measured in a plurality of points within a plane vertical to an optical axis whose center is the crossing point of its optical axis with the optical axis of the silica glass member is 50 ppm or lower, and in which the plurality of signed birefringence values obtained based on the birefringence values measured on several points within a plane vertical to an optical axis whose center is the crossing point of its optical axis with the optical axis of the silica glass member and the direction of the fast axis fall within a range of from -2.0 to +2.0 nm/cm.

5. (Original) A method for producing a silica glass member as claimed in Claim 4, wherein the production method further comprises a step of measuring the signed birefringence value in the later stage of the step of heat treating said silica glass member, said step comprising measuring the signed birefringence values inside said silica glass member.

6. (Original) A method for producing a silica glass member as claimed in Claim 4, wherein the silica glass member obtained in the step of heat treating said silica glass member yields a maximum value of the hydroxyl group concentration as measured in a plurality of points within a plane vertical to an optical axis whose center is the crossing point of its optical axis with the optical axis of the silica glass member of 50 ppm or lower.

7. (Currently Amended) A method for producing a silica glass member as claimed in Claim 4, wherein said plurality of signed birefringence values of said silica glass member are expressed based on the formulae as follows:

$$-2.0 \leq B_{ij} \leq 2.0 \text{ nm/cm} \qquad (1)$$

$$Bij = \frac{\sum_{k=1}^{h} A_{ijk}}{h} \qquad (2)$$

{where, in formulae (1) and (2) above,

i represents the number of said silica glass members L (i = 1, 2, ... m; 2 ≤ m),

j represents the number of concentrical virtual circles C present on an effective cross section vertical to the optical axis of said silica glass member L, each having a center on said optical axis and different from each other in radius from said optical axis (j = 1, 2, ... n; 1 ≤ n),

k represents the number of measuring points located on the circumference of said concentrical circles C (k = 1, 2, h; 1 ≤ h),

A_{ijk} represents the signed birefringence value at the kth measuring point P_{ijk} located on the circumference of a concentrical circle C_{ij} of a silica glass member Li, and B_{ij} represents the mean signed birefringence value corresponding to the arithmetic mean of the signed birefringence values of the measuring points located on the circumference of a concentrical circle C_{ij} of a silica glass member Li.}

8.   (Original) A method for producing a silica glass member as claimed in Claim 4, wherein the heat treatment performed in said step of heat treating the silica glass member comprises elevating the temperature of said silica glass member to a predetermined temperature not higher than 1200 °C, and after holding the temperature for a predetermined duration of time, cooling said silica glass member in a predetermined temperature region not higher than 1200 °C while controlling the cooling rate to a predetermined rate.

9.   (Original) A method for producing a silica glass member, comprising:

a synthetic step of silica glass bulk comprising, in a synthetic furnace equipped with a burner having a plurality of tubes, ejecting a raw material and a combustion gas from the plurality of tubes of said burner to hydrolyze said raw material in an

oxyhydrogen flame, and thereby synthesizing a silica glass bulk having a difference in the

maximum and the minimum values of hydroxyl group concentration as measured in a

plurality of points within a predetermined internal plane of the bulk of 50 ppm or lower;

a step of cooling silica glass bulk, comprising, while holding said silica glass

bulk inside said synthetic furnace, cooling said silica glass bulk based on the temperature

difference between the silica glass bulk and the temperature of the external environment;

a step of cutting silica glass bulk, comprising cutting out said silica glass bulk

to obtain a silica glass member having the desired shape and size;

a first heat treatment step of silica glass member, comprising elevating the

temperature of said silica glass member to a predetermined temperature in the temperature

range of from 1600 to 2300 °C in an inert gas atmosphere in a pressure range of from 0.01 to

0.15 MPa (abs); and

a second heat treatment step of silica glass member, comprising, in an inert

gas atmosphere maintained in a pressure range of from 0.01 to 0.15 MPa (abs), cooling said

silica glass bulk while controlling the cooling rate in the temperature region of from 1500 to

1800 °C to a range of from 5 to 10 °C/min to obtain a silica glass member in which a

difference in the maximum and the minimum values of hydroxyl group concentration as

measured in a plurality of points within a plane vertical to an optical axis whose center is the

crossing point of its optical axis with the optical axis of the silica glass member is 50 ppm or

lower, and in which the plurality of signed birefringence values obtained based on the

birefringence values measured on several points within a plane vertical to an optical axis

whose center is the crossing point of its optical axis with the optical axis of the silica glass

member and the direction of the fast axis fall within a range of from -2.0 to +2.0 nm/cm.

10.   (Original) A method for producing a silica glass member as claimed in Claim

9, wherein the method further comprises, between the first heat treatment step and the second

heat treatment step, a third heat treatment step of silica glass member comprising holding the silica glass member for a predetermined duration of time at a holding temperature in a range of from 1600 to 2300 °C.

11.   (Original) A method for producing a silica glass member as claimed in Claim 9, wherein said first heat treatment step of silica glass member is performed at a heating rate of from 1 to 10 °C/min.

12.   (Original) A method for producing a silica glass member as claimed in Claim 9, wherein the production method further comprises a step of measuring the signed birefringence value in the later stage of the second heat treatment step of said silica glass member, said step comprising measuring the signed birefringence values inside said silica glass member.

13.   (Original) A method for producing a silica glass member as claimed in Claim 9, wherein the silica glass member obtained in the step of heat treating said silica glass member yields a maximum value of the hydroxyl group concentration as measured in a plurality of points within a plane vertical to an optical axis whose center is the crossing point of its optical axis with the optical axis of the silica glass member of 50 ppm or lower.

14.   (Currently Amended) A method for producing a silica glass member as claimed in Claim 9, wherein said plurality of signed birefringence values of said silica glass member are expressed based on the formulae as follows:

$$-2.0 \leq B_{ij} \leq 2.0 \text{ nm/cm} \qquad (1)$$

$$\text{Bij} = \frac{\sum_{k=1}^{h} A_{ijk}}{h} \qquad (2)$$

{where, in formulae (1) and (2) above,

i represents the number of said silica glass members L (i = 1, 2, ... m; 2 ≤ m),

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j represents the number of concentrical virtual circles C present on an effective

cross section vertical to the optical axis of said silica glass member L, each having a center on

said optical axis and different from each other in radius from said optical axis (j = 1, 2, ... n;

$1 \leq n$),

k represents the number of measuring points located on the circumference of

said concentrical circles C (k = 1, 2, $\cdots$ h; $1 \leq h$),

A_{ijk} represents the signed birefringence value at the kth measuring point P_{ijk}

located on the circumference of a concentrical circle C_{ij} of a silica glass member Li, and B_{ij}

represents the mean signed birefringence corresponding to the arithmetic mean of the signed

birefringence values of the measuring points located on the circumference of a concentrical

circle C_{ij} of a silica glass member Li.]

15.   (Currently Amended) A projection aligner comprising an exposure light

source emitting a light having a wavelength of 250 nm or shorter as the exposure light, a

reticle having formed thereon an original pattern image, an irradiation optical system which

irradiates a radiation output from said exposure light source to said reticle, a projection

optical system which projects a pattern image output from said reticle onto a photosensitive

substrate, and an alignment system which aligns said reticle and said photosensitive substrate,

in which at least a part of the silica glass member constituting said irradiation

optical system, the silica glass member constituting said projection optical system, and said

reticle, is made of a silica glass member described in Claim 1 for use with a light having a

specific wavelength of 250 nm or shorter,

in which the difference in the maximum and the minimum values of hydroxyl

group concentration as measured in a plurality of points within a plane vertical to an optical

axis whose center is the crossing point of its optical axis with the optical axiss of the silica

glass member is 50 ppm or lower;

in which the plurality of signed birefringence values obtained based on the birefringence values measured on several points within a plane vertical to an optical axis whose center is the crossing point of its optical axis with the optical axis of the silica glass member and the direction of the fast axis fall within a range of from -2.0 to +2.0 nm/cm,

wherein said plurality of signed birefringence values of said silica glass member are expressed based on the formulae as follows:

$$-2.0 \leq B_{ij} \leq 2.0 \text{ nm/cm} \tag{1}$$

$$B_{ij} = \frac{\sum_{k=1}^{h} A_{ijk}}{h} \tag{2}$$

where, in formula (1) and (2) above,

i represents the number of said silica glass members L (i = 1, 2, ... m; 2 ≤ m),

j represents the number of concentrical virtual circles C present on an effective cross section vertical to the optical axis of said silica glass member L, each having a center on said optical axis and different from each other in radius from said optical axis (j = 1, 2, ... n; 1 ≤ n),

k represents the number of measuring points located on the circumference of said concentrical circles C (k = 1, 2, ... h; 1 ≤ h),

A_{ijk} represents the signed birefringence value at the kth measuring point P_{ijk} located on the circumference of a concentrical circle C_{ij} of a silica glass member Li, and B_{ij} represents the mean signed birefringence value corresponding to the arithmetic mean of the signed birefringence values of the measuring points located on the circumference of a concentrical circle C_{ij} of a silica glass member Li.